
Velsicol Chemical Corp. Hardeman County Landfill Superfund Site Landfill Disposal Areas Remedial Action (OU2)



National Priority Panel Briefing
March 5, 2013



General Site Description

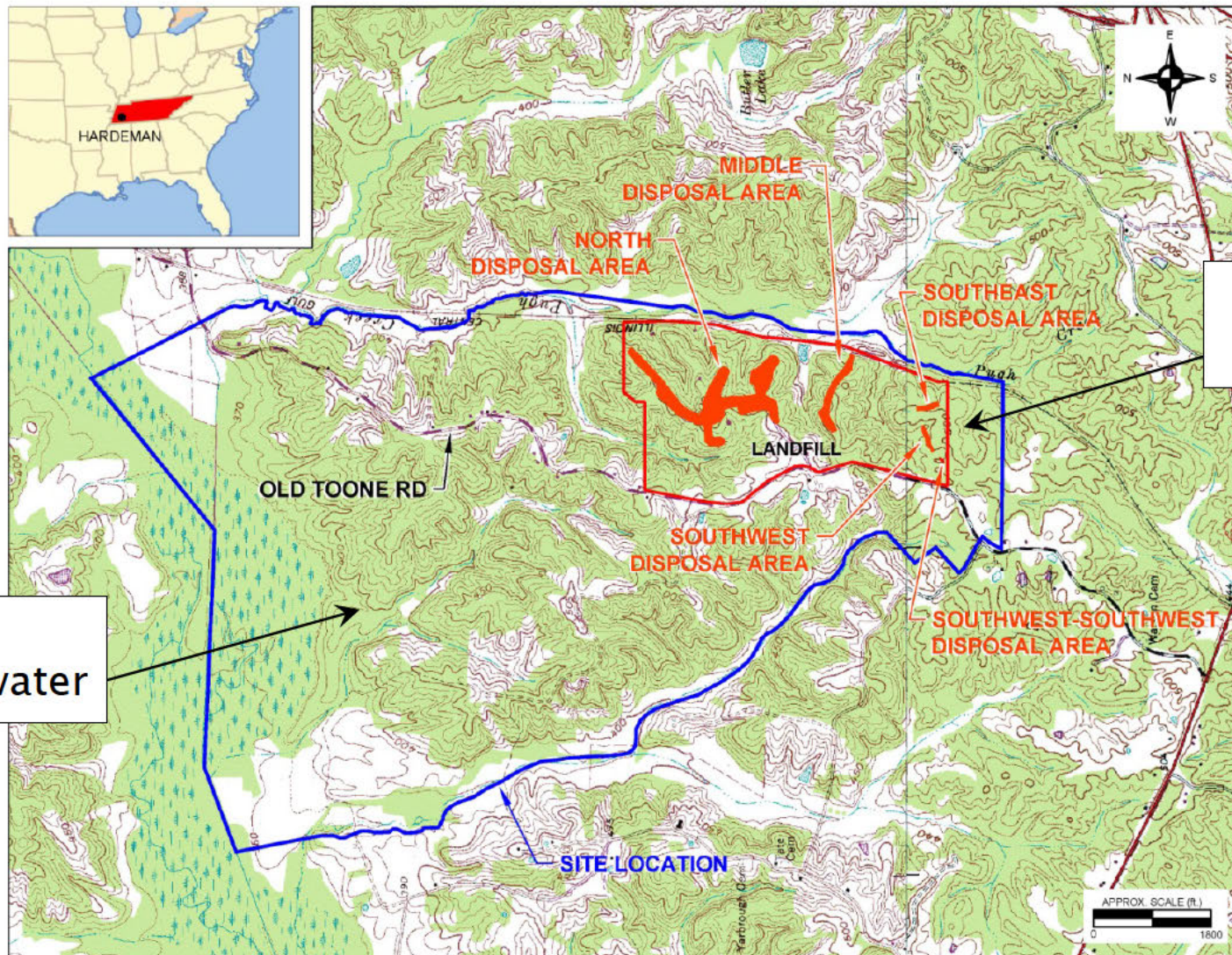
- **OU2 – Landfills**
 - Waste disposal from 1964 to 1973
 - Pesticide manufacturing waste with carrier VOCs
 - 130,000 to 300,000 drums buried in 3.3 linear miles of unlined trenches
 - Predominant VOC and risk driver for the site is carbon tetrachloride (CT)
 - Total VOC mass estimated at approximately 6,800,000 lbs
 - 24 acres of capped landfills

- **OU1 – Groundwater**
 - 1,725 acre groundwater contaminant plume exceeding CT MCL (5 ug/L)
 - 1,025 acres with CT exceeding 500 ug/L (>100 x MCL)
 - 525 acres with CT exceeding 5,000 ug/L (>1,000 x MCL)
 - Maximum CT concentration 40,000 ug/L (5% of its solubility limit)

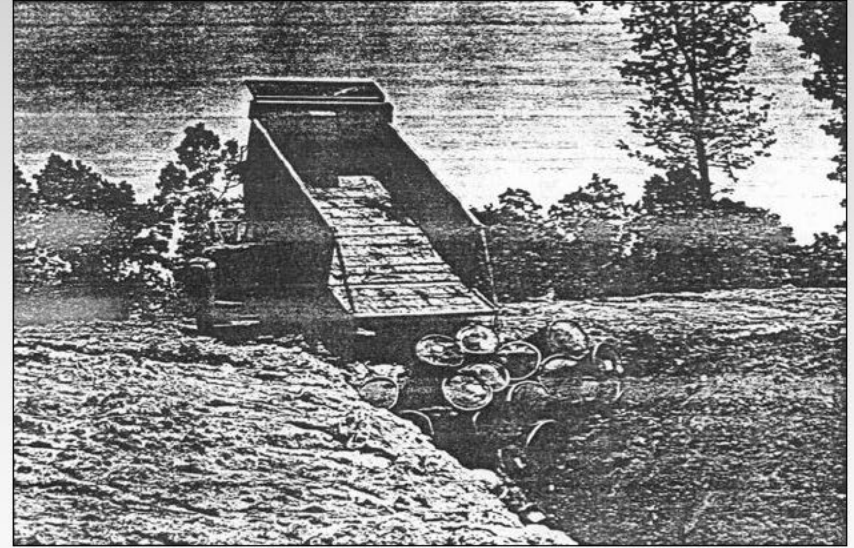
- **Mixed Land Use – Residential, Hunting, and Timber**



Site Location Map



Waste Disposal Operations



Scope & Role of Response Actions To Date

- Alternate water supply and construction of a 2 foot thick clay cap over the Landfill Disposal Areas occurred in the 1979/1980 timeframe.
- Records of Decisions (RODs) and Remedial Actions (RAs) were implemented for both OUs in the 1990s (groundwater pump and treat; and further capping).
- The findings of the Second (2006) and Third (2011) Site Five-Year Reviews were that the RAs were not protective of human health and the environment.



Principal Threat Waste

- Large Number of Buried Waste Drums
 - Vast majority of drums compromised
 - Limited number of intact drums with liquid waste

- Highly Mobile Carbon Tetrachloride Source Materials
 - Known NAPLs in Waste Disposal Zone
 - Suspected NAPLs in underlying Vadose Zone soils
 - Suspected NAPLs in Saturated Zone

- Highly Toxic (Immobile) Pesticide Waste Residues



Air Sampling Program Findings

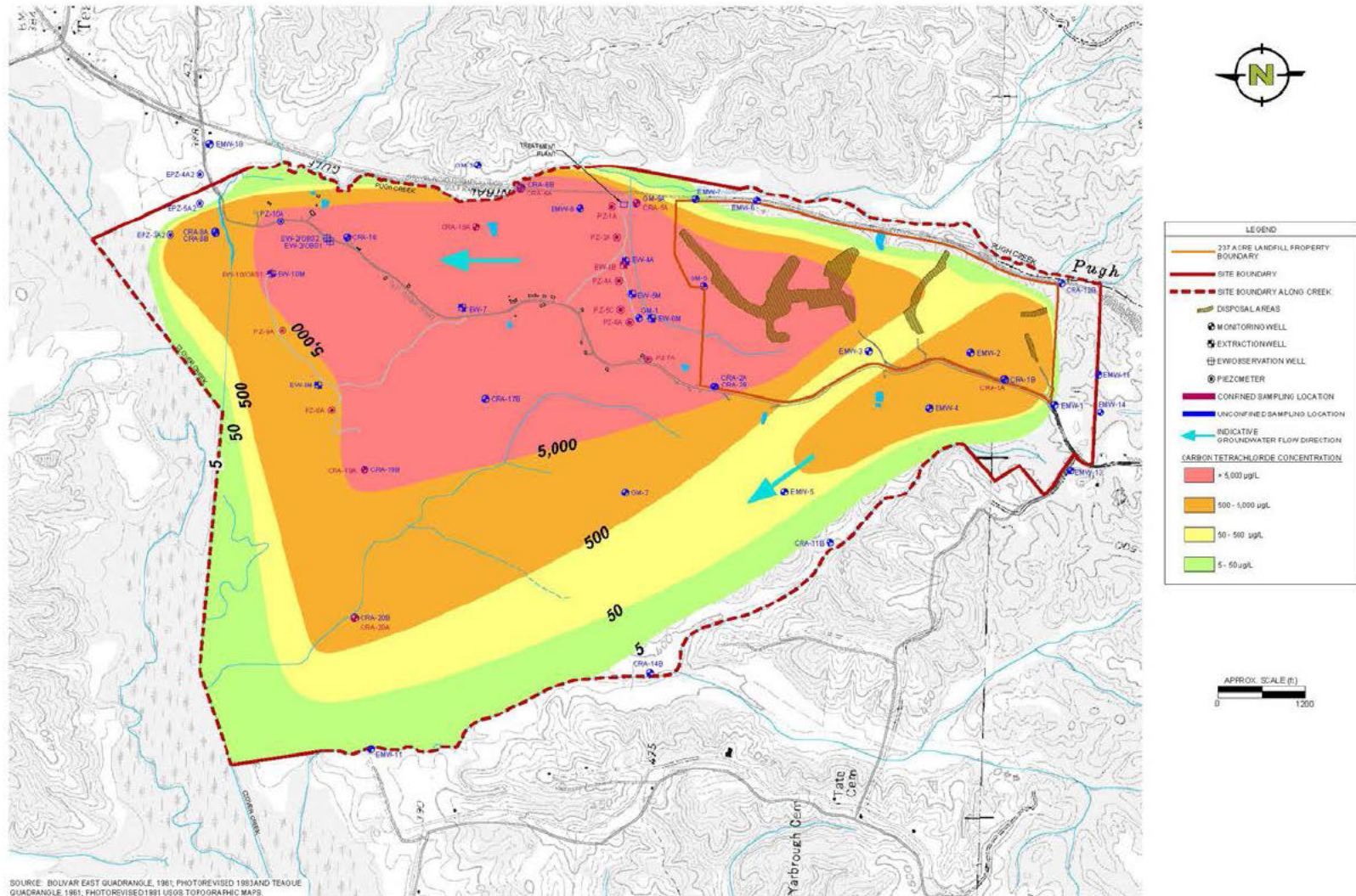
- Landfill disposal areas are a source of VOCs to the ambient air.
- Impacted surface waters are a source of VOCs to the ambient air.
- Vapor mitigation systems installed at two residences.



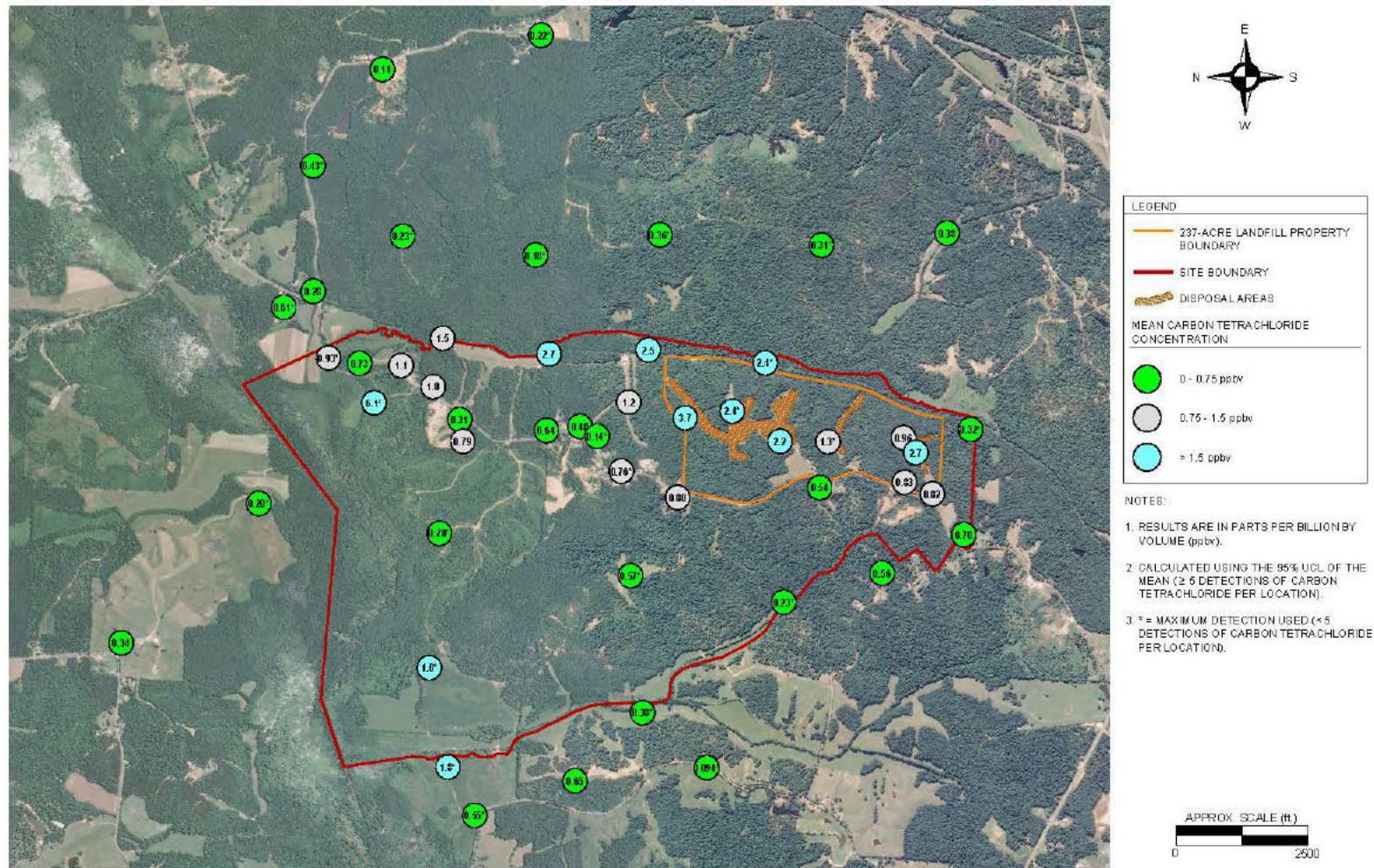
Ambient Air Risks

- 2007 and 2008 Ambient Air monitoring involved the collection of almost 800 samples. Based on the monitoring program results, the Landfill Disposal Areas are a source of VOCs to the ambient air.
- Risk Assessment for Ambient and Indoor Air
 - Risk assessment using average concentrations in ambient and indoor air below 1.0 E-4 Cancer Risk.
 - Some measured Carbon Tetrachloride concentrations in Ambient Air have exceeded the 1.0 E-4 Cancer Risk action level of 6.5 ppbv.
 - Don't know if levels will increase or decrease in the future.

Unconfined Aquifer Carbon Tetrachloride Isoconcentration Map



Mean Carbon Tetrachloride 2008 Ambient Air Conc. (ppbv)



SVE Pilot Test

- A Phase I SVE Pilot Test was conducted at the SWDA from 2009 to 2011.
- Objectives of the Phase I SVE Pilot Test were to collect SVE design data for the other Landfill Disposal Areas and to remediate the SWDA itself.
- A one year Phase II SVE Pilot Test was conducted at the SEDA and the SW SWDA in 2012.
- The SVE Pilot Tests successfully demonstrated that site conditions are conducive to SVE remediation.



SVE Pilot Test Extraction Well Installation



SVE Pilot Test



SVE Wells with Above
Ground Piping



SVE System Blower-
related Equipment



SVE System Air Treatment Unit

Phase I SVE Pilot Test Metrics

- Operated 10,000 hours
- 1,365 Pore Volumes Removed From Shallow Waste Zone
- 535 Pore Volumes Removed from Int/Deep Vadose Zone
- 31,300 lbs VOCs Removed
- 155,000 lbs of Carbon Consumed
- 94% Reduction in CT Conc. in Shallow Soil Gas (Post-Rebound)
- 99% Reduction in CT Conc. in Int/Deep Soil Gas (Post-Rebound)
- Lateral Pneumatic Influence and Reduction in CT Soil Gas Concentrations observed along the western side of the SEDA, approximately 250 ft east of the SWDA



Residential Risk Summary from 2011 HHRA

- **Current residents** may be affected by:
 - VOCs in ambient air from landfilled wastes / contaminated surface waters and VOCs in the indoor air from off-gassing from groundwater.
- **Future residents** may be affected by:
 - The above, plus if a drinking water well was constructed, contamination in groundwater via ingestion, inhalation and dermal contact.
- Additional direct contact risks for uncapped areas of drum trenches.

Remedial Action Objectives for OU2

- Prevent human exposure via direct contact with or ingestion of wastes/contaminated soils in the Landfill Disposal Areas with Contaminants of Concern (COCs) above levels that are protective.
- Prevent further migration of contaminants from the Landfill Disposal Areas to groundwater.
- Ensure that indoor/and ambient air COC levels do not exceed site specific risk based screening levels.
- Remove and treat significant VOC mass from the waste zone and underlying vadose zone soils proximal to the Landfill Disposal Areas to the maximum extent practicable.



SVE Specific Performance Based Standards for OU2

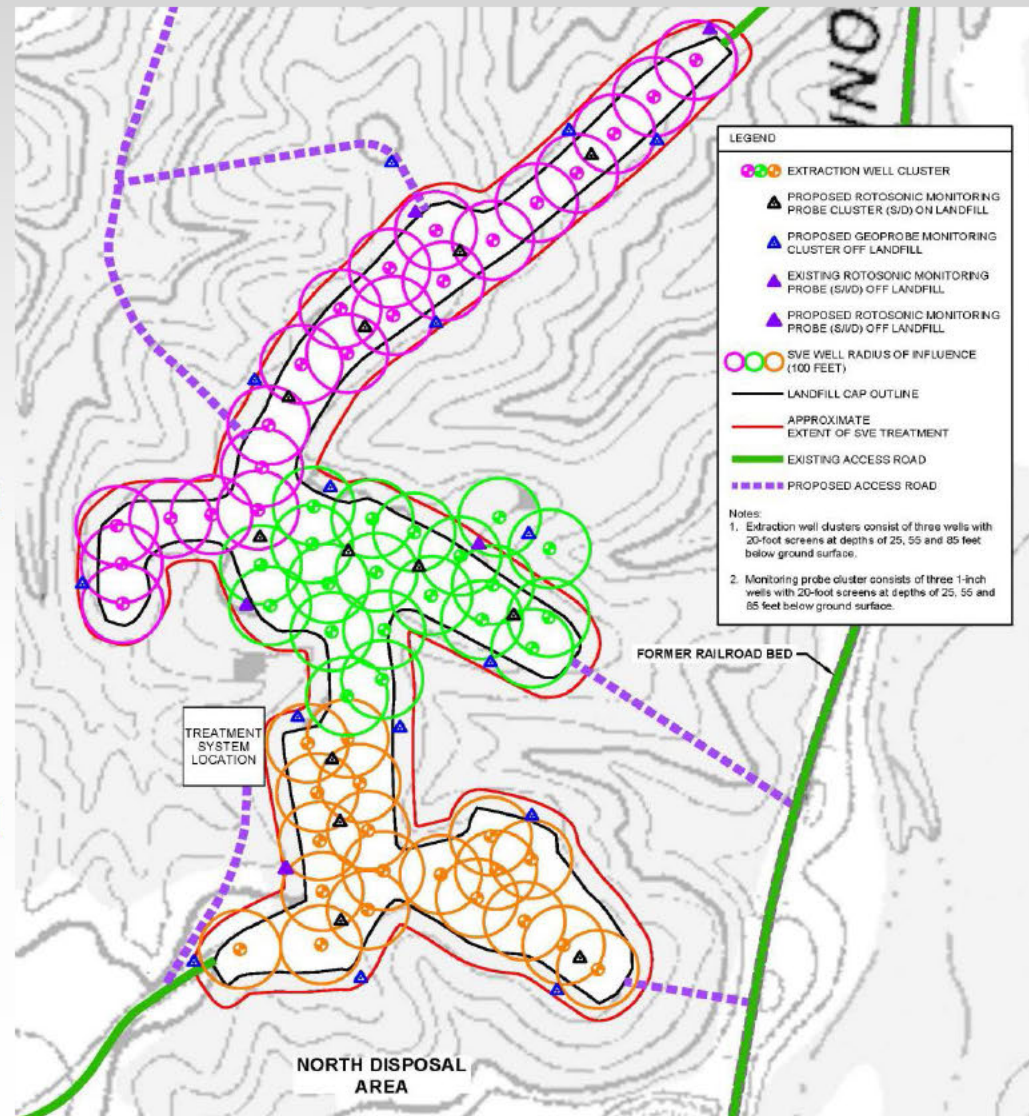
Success of General RAO Objective to “*remove and treat significant VOC mass from the waste zone and underlying vadose zone soils proximal to the landfill disposal areas to the maximum extent practical with SVE*” will be measured by means of specific performance based standards.

- To achieve a minimum 97% net reduction from baseline conditions of mean VOC soil gas concentrations for each respective treatment area.
- If mean VOC soil gas concentrations rebound to 6% of baseline conditions for a respective area over a maximum 3-year period, then the area will be re-treated to further reduce VOC concentrations.

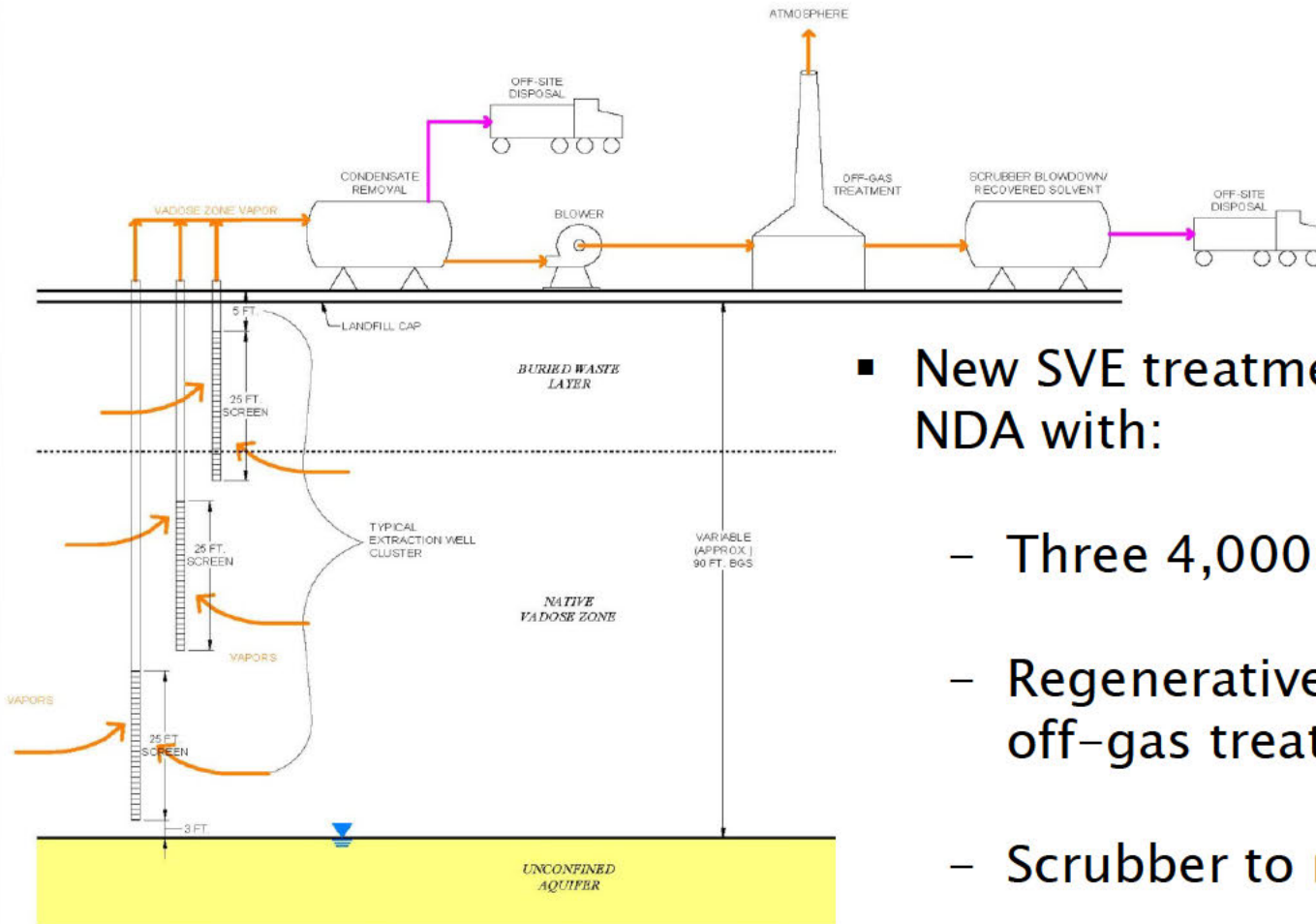


Conceptual SVE Well layout for the NDA

- Installation of:
 - Access road, treatment system compound, and utilities
 - 60 SVE well clusters with 125-ft spacing
 - 12 on-landfill and 16 off-landfill performance monitoring point clusters



SVE Remedial Components for the NDA



- New SVE treatment system for the NDA with:
 - Three 4,000 cfm blowers,
 - Regenerative Thermal Oxidizer off-gas treatment
 - Scrubber to remove acid gas
 - Offsite management of scrubber blow down water

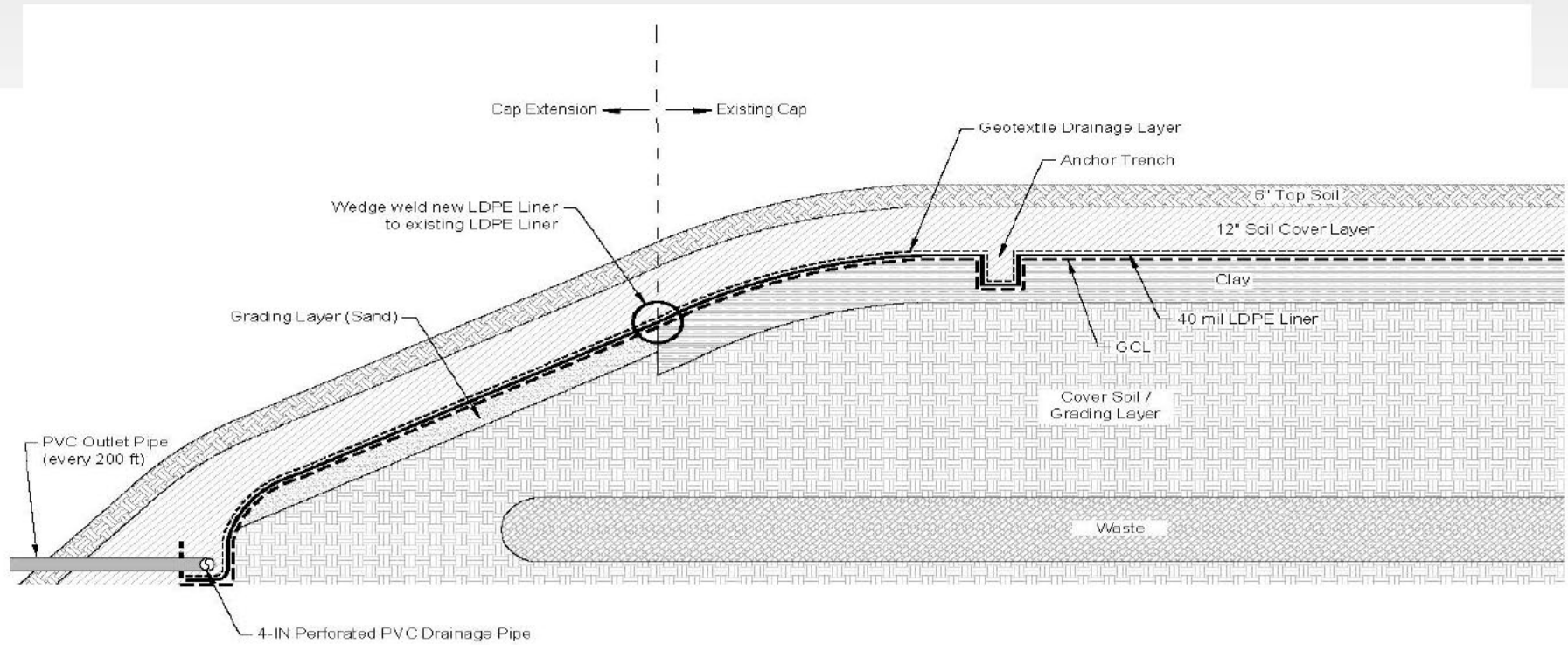
SVE at the NDA

- 12 years of SVE treatment based on:
 - Sequential treatment using 3 zones
 - 19 to 21 well clusters per zone
 - 4 years of SVE treatment/treatment zone
 - First 6 years: 2 year increments of SVE treatment in each of the 3 treatment zones.
 - Second 6 years: SVE treatment rotated between treatment zones on a quarterly or semi-annual basis.
- 3 years of post SVE rebound monitoring.



NDA and MDA Cap Extension

- 2,100 liner feet of geo-composite cap extension.
- Occasional addition of a grading layer to address topographical side slope conditions.



Independent Optimization Review of Draft FFS

- Systematic site review by a team of independent technical experts (Tetra Tech GEO and EPA Headquarters)
- Conducted January 18, 2012 Site Stakeholder Meeting
- Team reviewed the January 17, 2012 Draft OU2 Focused Feasibility Study and other pertinent site information
- The optimization/review team concurred that SVE is the most cost-effective and implementable means by which contaminant mass can be removed from the site.
- The optimization/review team preferred the SVE remedial alternative over the combined SVE and excavation remedial alternative based on evaluation of effectiveness, implementation, and cost.
- The optimization/review team concurred that the SVE remedial alternative will result in significant reduction in mass of VOCs at the site and address the NCP criteria for reducing contaminant toxicity, mobility, or volume through treatment whereas the capping remedial alternative does not.



Remedy Benefits



- Addresses statutory preference for reduction in toxicity, mobility or volume of contamination through treatment.
- Active treatment of the highly mobile carbon tetrachloride principal threat component that is the human health risk driver for the Site.
- Removal of ~ 5,000,000 to 6,000,000 lbs of VOCs.
- Significant Reduction in the Landfill Disposal Areas as a continuing source of VOCs to the groundwater and ambient air.
- Implementable at a moderate cost with an acceptable risk of remedy.

Exemption 5: DPP

Questions?

